Transcatheter ventricular septal defect closure – A tertiary care center experience from South India

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Background: Transcatheter Ventricular septal defect (VSD) device closure is an accepted treatment option for isolated muscular VSDs & certain membranous VSDs.
Methods: VSD transcatheter closure was attempted in 120 patients with various devices indifferent anatomical types of VSD between November 2008 & July 2014 using antegrade approach in all cases except one.
Results: Twenty seven perimembranous, 64 basal-muscular, 20 mid-muscular, 6 sub-pulmonic VSDs were successfully closed. 3 patients had multiple VSDs. Median VSD size was 5 mm. Average fluoro-time was 24 min (range 12–42 minutes) which decreased to 11-15 min in 2013-14 with increasing operator experience. Devices implanted were duct occluder in 100, muscular device in 13, septal occluder in 1, asymmetric (2 cases) & symmetric perimembranous devices (1 case). The procedure was successful in 106 cases (91%) with complete closure of the shunt immediate post-procedure or within 24 hours, without any complications. Repeat echo was done at out-patient follow up at 48 hours, 6 months, & then yearly. Surgical intervention was sought in 7 cases during the initial learning curve (2-device embolization, 2-tricuspid regurgitation, 1-complete heart block, 1-persistent hematuria,1-significant residual shunt). Four patients with post-procedure junctional rhythm (treated with oral steroids), 3 with asymptomatic RBBB& 2 with mild aortic regurgitation (AR) are under continuous close follow-up. In 3 patients, the procedure was abandoned due to intra-procedural conduction defect/arrhythmias in 2 &AR in 1.
Conclusion: Complications of transcatheter closure of congenital VSDs are limited, mostly seen during the initial learning curve. More experience &long-term follow-up confirm the safety & efficacy as a viable alternative to surgery. This study also demonstrates the feasibility of use of duct occluder for VSD closure, including subpulmonic VSDs.

Early and late outcomes after pulmonary valve balloon dilatation from neonates to adults – A tertiary care centre experience

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Background: PVBD is the treatment of choice for congenital PV stenosis, with proven good short term results. This review was designed to study demographic profile of, and document early and late outcomes after percutaneous balloon dilation (PVBD) in patients presenting to a tertiary care centre with pulmonic stenosis.
Material and Methods: Demographic, clinical and echocardiographic data regarding PVBD was reviewed for patients undergoing PVBD between 2001 and 2014.The dilation was done from femoral venous access by previously described standard methods after crossing the stenosed valve. Semicompliant Tyshak balloons if annulus < 22 mm and Accura balloons if PV annulus > 22 mm were used to dilate the valve with maximum BAR (Balloon-to-annulus ratio) of 140%. PVBD procedures were done from jugular access in 3 cases due to severe TR in RV dysfunction precluding wire and catheter entry from RA to RV despite multiple attempts. Successful PVBD was defined as reduction of RV-to –PA gradient > 50% with no complications.
Results: In the study period mentioned above, 1041 (M=529: F=512) patients underwent PVBD of whom 82 patients underwent the procedure twice (of these 82, 8 were Noonan phenotype). 126 patients had at least additional mild infundibular PS, 379 had a concomitant ostium secundum ASD and 12 had tiny basal muscular (n=7) and 5 had small apical muscular VSD. 19 patients were congenital rubella syndrome phenotype, and Noonan syndrome phenotype was seen in 32 patients, though genetic testing was not available. The youngest patient was a 7-day old male child and the oldest was 60 year old (mean age13, median age=10.5 yrs). PV gradients decreased from mean 78+/-30 mmHg to 24+/-19 mm Hg ($p<0.0001$) and remained low during a mean follow-up of 8.9+/-3.1 (range 3.7 to 14 years).

PVBD was also done for TOF patients (n=15), for Dysplastic valves (n=22), Supravalvular PS in 19 cases with PVBD and RPA plasty done in 3 cases and Ebstein's anomaly with valvular PS in one case. RVOT conduit dilation for stenosed Hemashield graft was also done in one case with post-truncal repair conduit stenosis. PVBD was done for 82 patients of PS with severe RV dysfunction and 92% patients in this group had satisfactory immediate and dramatic results with RV function starting to improve as early as 24 hours post PVBD. Concomitant ASD device closure with PVBD was done in 11 patients.

Freedom from re-intervention at 1, 10 and 14 years were: 99%, 96%, and 91% respectively among the patients who continued to be followed up. Moderate post-PVBD pulmonary regurgitation (PR) occurred in upto 49% patients after PVBD but decreased during follow-up. The gradient across the stenosed valve in successful PVBD showed an immediate post-PVBD fall, followed by a trend to decrease further over time due to favourable RV remodeling and regression of RV hypertrophy. Predictors of less favourable PVBD result requiring repeat PVBD were initial high RV-to-PA gradients > 75 mm Hg, PVBD for dysplastic valves, PVBD in Noonan syndrome, presence of additional severe infundibular stenosis, presence of hypoplastic annulus, and severe RVH.
Conclusions: Starting even from neonatal PS, PVBD is an efficacious procedure for treatment of congenital pulmonic stenosis with satisfactory short and long term results in patients, and is associated with immediate fall in PV gradients and dramatic improvement of RV function,though RVH regression occurs in majority of patients over a longer time period. Although post-PVBD PR occurs commonly, it is well tolerated and decreases eventually over time. Even in patients with an initial favourable result, gradients continue to decline with continued favourable RV remodeling indicating that immediate post-PVBD gradient alone may not be the only predictor of longer term favourable outcomes.

Can non-invasive assessment replace invasive pre-operative assessment in Tetralogy of Fallot?

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Background: As the Tetralogy of Fallot (TOF) is the most common cyanotic heart disease, and the anatomy of pulmonary artery is the key determinant for surgical repair, precise assessment of pulmonary artery by some readily available harmless simple

technique is must; and in that scenario echocardiography has an edge over other modalities. Moreover studies showed a good correlation of echocardiographic measurements with angiographic ones which is being supposed to be mandatory by surgeons. The aim of this work was to evaluate the reliability and strength of non-invasive assessment of the pulmonary anatomy by comparative study.

Method: 76 patients (mean age 38± 27 mo) with only usual anatomy of TOF were included and echocardiography assessment was done for all. Alternate child was undergone either (multi-detector cardiac CT 64 slice(MDCT-group 1) or cardiac cath-angio (CCA-group 2) before total surgical repair (done in 24 patient till date) and parameters measured by each modality was compared. Parameters are 'Pulmonary artery index (PAI) according to Nakata' and 'McGoon', 'Z-value for the pulmonary artery branches' and 'pulmonary annulus Z score' (age adjusted 'z' score calculated using Detroit data).

Result: The results showed that in group 1, though there was some difference in measurement of RPA & LPA in pre-branching segment measured by echo and MDCT, a statistically significant correlation (r value 0.68, p value 0.0005) in the measurements of RPA & LPA and consequently the calculated Z value and the PAI between the two modalities was found; and similarly, group II patients demonstrated a statistically significant correlation (r value 0.56, p value 0.008) of measurements of RPA & LPA and consequently the calculated Z value and the PAI between the echocardiographic and CCA methods. The correlation between the echocardiographic and the MDCT measurements was stronger than those detected between the echocardiographic and angiographic measurements. And moreover in group 1 non-invasively obtained parameter correlated better with surgically found measurement than those obtained by CCA in group 2. The maximum difference between the echocardiography and surgery for the RPA & LPA was 2.4 mm and 2.0 mm and the mean difference was 0.81 ± 0.43 and 0.64 ± 0.48 mm respectively. Detection of associated cardiac anomalies, MAPCAs, coronary anomaly was not greater by CCA than MDCT also.

Conclusion: A 2-D echocardiography is accurate and precise in estimation of the pulmonary artery branches and thus surgical management of usual TOF, can be supplemented by non-invasive MDCT in selected cases for information about MAPCAs, associated anomalies, patient with poor echo-window etc. Invasive cardiac catheterization can easily be avoided along with its usual hazards like radiation and nephrotoxicity.

Causes of Hemoptysis in Eisenmenger Syndrome – A CT Angiography Study

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Background: Hemoptysis is a common cause of morbidity in Eisenmenger syndrome, but the causes of hemoptysis are not well defined. We analyzed the clinical predictors and causes of hemoptysis in a cohort of patients with Eisenmenger syndrome using computerized tomographic pulmonary angiography (CTPA).

Methods: Of the 95 patients of Eisenmenger syndrome studied (mean age 23.7 ± 7.7 years; 57 male), 38 patients (40%) had presented with hemoptysis, and all of them underwent a CTPA within two weeks of index bleed.

Results: Patients with hemoptysis had a reduced 6 minute walk distance (356.2 ± 92.5 meters) as compared to patients without hemoptysis (395.1 ± 126.9 meters) (p = 0.03). However, other baseline demographic characteristics including diagnosis, complexity of lesion, functional class, and symptoms did not differ among patients with and without hempotysis. Of the 38 patients, 17 had a treatable cause of hemoptysis and received appropriate treatment. The identifiable causes included aorto-pulomanray collaterals, pulmonary thrombosis (2 patients), pulmonary tuberculosis (2 patients), pulmonary artery dissection (1 patient). Treating an identifiable cause reduced the risk of recurrence of hemoptysis by 0.46 (95% CI 0.28 – 0.64).

Conclusion: Hemoptysis remains a major cause of morbidity in patients with Eisenmenger syndrome. Hemoptysis occurs more frequently in patients with greater exercise limitation. CT pulmonary angiogram immediately following an episode of hemoptysis could identify a potentially treatable cause in nearly half of the patients and such treatment results in lesser recurrence of hemoptysis.

Transcatheter device closure of VSD – A single centre experience

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Introduction: Ventricular septal defects are the most common congenital cardiac defects (30% of all CHD). Perimembranous defects account for 70% of these cases, while muscular defects account for 20%. Surgery is the standard therapy with low mortality and complications rate. It requires cardiopulmonary bypass with significant inflammatory response, surgical scar, limitations of activity following surgery. Transcatheter closure of VSDs has been introduced, advanced rapidly, with improvements in device designs. Aim of the work is to report the early results of transcatheter VSD closure in cardiology Unit, Children Hospital, Mansoura University.

Methods: 26 patients have undergone transcatheter closure of VSD, 15 were males and 11 were females, age ranges from4 to 23 years. Patients should have significant left to right shunt through VSD (*Frequent chest infections, Effort intolerance, Cardiomegaly due to LA, LV dilatations and increased LV EDD > 2 SD*). Anatomy suitable for transcatheter closure: rim of =/> 5mm separating VSD from aortic valve, tricuspid valve.

All the patients were generally anesthetized using cevoflurane, 20 procedures were done under TEE, one with TTE and fluoroscopic guidance, Right and left heart catheterization were done according to standard protocols, Patients received 100 IU/Kg Heparin and 100mg/Kg Cephalosporin, Shunts and PVR were calculated.

Results: 13 cases had perimembranous VSD, one of them was associated with PDA, 4 cases with muscular outlet VSD, 5 cases with mid muscular VSD, 4 cases were residual following VSD surgical closure. For perimembranous VSD 7 ADO I , 6 PFM Nit occlude coil were used, for muscular outlet VSD 1 Amplatzer MVSD, 1 ADOI, 2 PFM Nit occlude coil were used, for mid muscular VSD 3 Amplatzer MVSD , 2 PFM Nit occlude coil, for residual s/p surgical VSDs 1 ADO II , 3 PFM Nit Occlud coil were used. One ADO I device embolized in perimembranous VSD which was retrieved successfully.

Conclusion: Transcatheter closure of VSD has encouraging results. Excellent closure rates on short term follow up with Low